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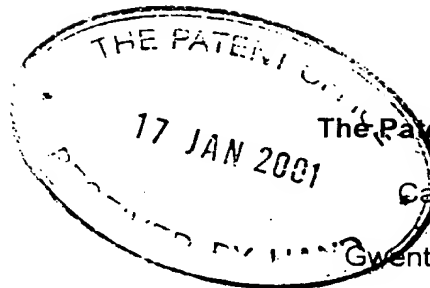
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18JAN01 E598768-19 D02246  
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3. Full name, address and postcode of the  
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SUN MICROSYSTEMS, INC  
901 SAN ANTONIO ROAD  
PALO ALTO  
CALIFORNIA 94303  
UNITED STATES OF AMERICA

Patents ADP number (if you know it)

7480239001

If the applicant is a corporate body, give  
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STATE OF DELAWARE, UNITED STATES OF  
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4. Title of the invention

SYSTEM CONFIGURATION CARD SECURITY

5. Name of your agent (if you have one)

D YOUNG & CO

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59006

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1st

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0021456.9

31 Aug 2000

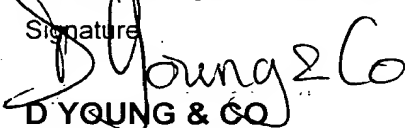
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## SYSTEM CONFIGURATION CARD SECURITY

## BACKGROUND OF THE INVENTION

5 This invention relates to system configuration card security.

The use of a system configuration card for giving a network identity to network connectable equipment has been proposed in co-pending application GB-0021456.9, filed 31 August 2000. A copy of co-pending application GB-0021456.9 is supplied  
10 with this application to be placed on the public file of this application. The full content of GB-0021456.9 is incorporated herein by reference.

The proposed system configuration card is in the form of a so-called smart card. The network connectable equipment is provided with a card reader for reading a smart  
15 card. The proposed use of a system configuration card provides many advantages. One advantage is the ease of transfer of a network identity between units in the event, for example, that a unit connected to a network develops a fault and needs to be replaced. The system configuration card can hold much more information than merely the network identity and typically this will be the case.

20 However, it is the advantages of the use of a system configuration card that also bring disadvantages, in that it would be possible for a card to be accidentally or deliberately removed or exchanged between system units. This could result in system units and/or the network failing or not operating correctly.

25

The present invention seeks to address this by improving system configuration card security.

## SUMMARY OF THE INVENTION

A first aspect of the invention provides a system configuration card for providing system configuration information to a system unit. The card includes a circuit, circuit contacts, and a notch in one edge of the card. The notch is configured to cooperate with a restraint when located in a card reading station for securing the card in the card reading station.

The use of the notch in the card means that the card can be inserted within a card receiving slot, and then the restraint can be engaged with the notch. This enables variable levels of security to be applied with regard to the prevention of the removal of the card. The user is able to choose whether to provide high security, for example to prevent a disaffected employee from deliberately removing the card, or a low level of security where the user is merely interested in preventing inadvertent removal of the card.

The system configuration card can be a conventional smart card, except that it is provided with the aforementioned notch and is provided with system configuration information. Thus the card can be rectangular, having two shorter edges at opposite ends of the card and two longer edges at opposite sides of the card, the notch being provided in one of the shorter edges. The circuit contacts are typically located towards one of the shorter edges at one end of the card with the notch being formed in the shorter edge at the other end of the card. This enables the provision of means for applying the restraint to be located at the exterior of the card reading station.

Another aspect of the invention provides a system configuration card reading station for reading a system configuration card as defined above. The reading station comprises a card receiver defining a slot for receiving the card, and a card reader including card reader contacts for contacting the circuit contacts on the card wherein the card reader contacts are located so as to contact the circuit contacts on the card when the card is received within the slot, the card receiver further being configured to

enable a restraint to engage the notch in the card for securing the card in the card reading station when the card is received within the slot.

The card receiver comprises a protuberance, the slot comprising a passage with a slit-shaped cross section that is open at one end of the protuberance and passes through the protuberance in the direction of the card reader. A hole is formed in the protuberance, which hole passes between opposite surfaces of the protuberance through the slit-shaped passage at a position corresponding to that occupied by the notch in a system configuration card that is inserted in the slot with the card reader contacts in contact with the circuit contacts on the card.

In an embodiment of the invention, the restraint can be manually insertable through the hole to engage the notch in the card, thereby securing the card in the slot. For example, the restraint could be a padlock or a wire with a seal to provide a high degree of security, or a cable tie to provide a lower degree of security.

A further aspect of the invention provides a card receiver forming a slot-defining unit mountable in an aperture in a wall of a system unit. The card receiver comprises a first portion of larger cross-sectional area that defines a protuberance to project from the wall and a second portion of smaller cross-sectional area to be received within the aperture in the wall. The slot passes through both portions of the card receiver to define a slot that passes through the wall of the system unit. The first portion further comprises a hole formed in the protuberance, which hole passes between opposite surfaces of the protuberance and traverses the slot for receiving a restraint to engage the notch in the card for securing the card in the card reading station.

The second portion of smaller cross-sectional area includes wedge-shaped detents configured, for mounting of the card receiver in the aperture, to pass through the aperture in the wall of the system unit and to latch behind the wall when the card receiver is fully inserted.

The invention also provides a method of securing a system configuration card for providing system configuration information to a system unit in a card reading station in the system unit. The method comprises: providing a system configuration card that includes a circuit, circuit contacts and a notch in one edge of the card; inserting the  
5 card in a card receiving slot in a card receiver until the circuit contacts make contact with reader contacts of a card reader; and engaging a restraint with the notch to secure the card in the card reading station.

A particular application of a system configuration card is in the context of a rack-mountable computer server. In the event of the computer server developing a fault, it  
10 can then be removed from the racking. The system configuration card can be removed from the faulty unit and then be inserted in a replacement unit, which replacement unit can then be replaced in the racking. It will be appreciated that this provides a convenient, efficient and rapid and reliable method of transferring system  
15 configuration information between system units. The provision of a mechanism for providing a restraint for the system configuration card means that this approach to system configuration can be used in a secure manner.

Further aspects and advantages of the invention will become apparent from the  
20 following description of a preferred embodiment.



## BRIEF DESCRIPTION OF THE DRAWINGS

Exemplary embodiments of the present invention will be described hereinafter, by way of example only, with reference to the accompanying drawings in which like  
5 reference signs relate to like elements and in which:

Figure 1 is a physical plan view of a computer system that implements an embodiment of the invention;

10 Figure 2 is a schematic representation of a system configuration card in accordance with an embodiment of the invention;

Figure 3 illustrates such a system configuration card being inserted into a system card configuration reading station of the computer system of claim 1;

15 Figure 4 illustrates the system configuration card fully inserted in the card reading station;

Figure 5 is a perspective view of one example of a card receiver for the card reading  
20 station shown in Figures 3 and 4;

Figure 6 is a front view of the card receiver of Figure 5;

Figure 7 is a plan view of the card receiver of Figure 5;

25

Figure 8 is a side view of the card receiver of Figure 5;

Figure 9 is a perspective view of another example of a card receiver in a rear wall of the computer system of Figure 1 from the outside of the computer system;

30

Figure 10 is an internal view of the computer system showing the card receiver of Figure 9; and

Figure 11 is a detail of the card receiver of Figures 9 and 10 with a card partially inserted therein.

## DESCRIPTION OF PARTICULAR EMBODIMENTS

Exemplary embodiments of the present invention are described in the following with reference to the accompanying drawings.

5

An exemplary embodiment of the present invention will now be described, by way of example only.

Figure 1 is a physical plan view of narrow form-factor computer system 1 designed  
10 for rack mounting. This computer system is compactly configured while offering high performance at reasonable cost.

The computer system 1 comprises a housing 10 with a front bezel 19 that is removable for front access to the disk drives and a System Configuration Card (SCC)  
15 23 and reader 22. Rack mounting is supported for standard 19" racks via right-angled flanges (not shown). Slide-rail support is also provided.

The housing 10 is cooled, from front to rear, by two system fans 12, 14 mounted on a rear panel of the housing, with venting in the front and rear panels as required. The  
20 host processor (CPU) 16 also has its own dedicated local cooling comprising an impingement fan 18 that clips onto the CPU socket. These three fans plug directly into the motherboard 20 at 13, 15 and 17, respectively. The motherboard 20 is a PCB assembly, designed in a custom form-factor to fit the housing 10. The shape of the motherboard is chosen so as to minimise cabling within the housing. The  
25 motherboard 20 carries the majority of circuitry within the computer system 1.

All external interfaces are included directly on the rear edge of the motherboard, for access through the rear-panel 11 of the housing 10. The external interfaces comprise two network interfaces 21, two serial interfaces 84, 86 and a Small Computer System  
30 Interface (SCSI) interface 78. Indicators for Power, Fault and Network Link status are also positioned at the rear of the housing.

A system, or host, processor (CPU) 16 for the computer system 1 is mounted in a standard 370 pin zero insertion force (ZIF) socket on the motherboard 20. It has a passive heat sink. Dual in-line memory modules (DIMMs) are mounted in sockets 25 on the motherboard 20. A small printed circuit board (PCB) 22 is included at the front of the housing 10 to carry a System Configuration Card (SCC) 23 and LEDs 27 for Power and Fault status indication. A 10-way ribbon cable 24 connects this PCB to the motherboard 20. Two SCSI hard disk drives 26 and 28 are mountable in respective bays to the front of the motherboard 20. The drives are hot pluggable and are accessible by removal of the front bezel 19 and EMI shields 30. The two internal SCSI hard disk drives 26 and 28 plug directly into the motherboard via right-angled connectors 32 located on the front edge of the motherboard 20.

A slim (notebook-style) CDROM drive bay is provided, mounted laterally in front of the motherboard for a CDROM drive 34. Compact disks may be inserted and removed via an access slot (not shown) located on the lower left side of the front bezel 19. A connector at the rear of the CDROM bay connects the CDROM drive 34 via a ribbon cable 36 to the motherboard 20.

A Power Supply Unit (PSU) 38 is connected to the motherboard via a short harness 40 with two mating connectors 42 and 44 for power and services. The PSU 38 has its own cooling fan 46 and additionally houses the system power switch (48) and power input connector(s) 50.

Figure 2 is a schematic representation of a system configuration card in accordance with an embodiment of the present invention. The system configuration card 23 can be a conventionally sized smart card having an integrated circuit embedded in the card with circuit contacts 304 on one surface of the card. A system configuration card 23 is substantially rectangular with two longer sides and two shorter sides. In an embodiment of the invention, a notch 302 is formed in one of the shorter sides at the opposite end to the circuit and circuit contacts 304.

Figure 3 shows a system configuration card 23 (as shown in Figure 2) being inserted into a card reading station 350 that comprises a card receiver 310 and a card reader 330 mounted on the PCB 22 mentioned with reference to Figure 1.

5

The system configuration card 23 is shown with the printed circuit on the underside for being read by the card reader 330. The card receiver 310 provides a slot for receiving the system configuration card 23 and for guiding the system configuration card into the card reader 330. The card receiver 310 is provided with a hole 314 through which a locking device can be inserted for securing the card in the inserted position. As shown in Figure 3, with the card 23 partially inserted, the hole 314 is blocked by the card 23.

However, when the card 23 is fully inserted, as shown in Figure 4, at which time the circuit contacts in the card are in contact with card reader contacts (not shown) provided within the card reader 330, the hole 314 in the card receiver 310 aligns with the notch 302 in the card 23. In this position, a locking device, for example a padlock, a wire with a seal, a cable tie, or the like, may be inserted through the hole 314 to lock the card in place. In the fully inserted position as shown in Figure 4, it will be noted that a small portion of the card 306 is still visible in a recess 312 in the card receiver 310, whereby the end of the card can be gripped to pull the card out of the card reader 330 assuming that a restraint or locking device is not provided through the hole 314 at that time.

25 Figures 5-8 illustrate a first example of the card receiver in more detail.

Figure 5 is a perspective view of the first example of the card receiver 310. This includes a front portion 320 of larger cross section and a rear portion 326 of smaller cross section. The rear portion 326 has two wedge shaped detent members 328 on an upper surface and two further wedge shaped detent members 328 on a lower surface, whereby the card receiver 310 may be inserted through an aperture in the front wall

340 of the computer system housing until that front wall abuts against the end of the front portion 320 of the card receiver 310. At that point, the wedge shaped detent members 328 latch behind the front wall 330 of the computer system housing securing the card receiver in place.

5

As can be seen in Figure 5, the front portion 320 of the card receiver 310 is provided with a recessed portion 312 that provides an area for gripping a card, when inserted in the card receiver, in order to remove the card. A restraining device (restraint) such as, for example, a padlock, a wire with a seal, a cable tie, or the like, may be inserted  
10 through the hole 314 to engage with the notch on a card 23, as previously described.

Figure 6 is a front view of the card receiver 310 of Figure 5, which shows, in particular, the front portion 320 of the card receiver 310. Figure 6 clearly shows an upper portion 321 and a lower portion 323 of the card receiver, with end portions 325  
15 and 327, to define between them a card receiving slot 316. Figure 6 also shows the recessed portion 312, as well as the top and the bottom of the hole 314 that passes through the upper and lower portions 321 and 323 of the card receiver 310.

Figure 7 is a plan view of an example of the card receiver 310 of Figure 5 showing in  
20 more detail the hole 314 and the recessed portion 312 of the front portion 320 of the card receiver. The triangular marks 318 indicate a direction of insertion of the card receiver. Figure 7 further shows the wedge shaped portions 328 that overlie the portion 327 of reduced cross section forming the rear portion 326 of the card receiver 310. As shown in Figure 7, the wedges 328 stop just short of the rear face of the front  
25 portion 320, whereby a narrow gap is formed between the wedges 328 and the rear face 319 of the front portion 320 to effect latching of the card receiver in the aperture in the front wall 340 of the computer system housing.

Figure 8 is a side view of the card receiver 310 of Figure 5 showing the front portion  
30 320, the rear portion 326 including the portion 327 of reduced cross section and the wedges 328.

The card receiver can be made from a plastics material such as a PC + ABS material, for example from GE CYCOLOY C6200.

- 5 Figure 9 is a view of an alternative example of a card receiver 310 inserted in an opening in the rear wall 340 of the computer system 1 of Figure 1. It can be seen that the front portion 320 of the card receiver 310 shown in Figure 9 corresponds to the front portion 320 of the card receiver 310 shown in Figure 5. Accordingly, like reference signs have been used for like components. Figure 9 shows a card fully  
10 inserted within the card receiver 310, whereby the notch 302 is aligned with the through hole 314, whereby a restraint may be inserted through the through hole and the notch 302 as described earlier.

Figure 9 also shows a cover 600 of the computer system 1.

- 15 Figure 10 illustrates an interior view of the housing of the computer system 1, showing the rear portion 336 of the alternative version of the card receiver shown in Figure 9. As seen in Figure 10, the alternative version 336 of the rear portion of the card receiver shown in Figures 9 and 10 includes a cut out 337 in the rear wall 327, whereby the rear wall 327 extends along a lower portion 327', the sides, and two  
20 regions 327'' at the edge of the card slot. Two wedge shaped detents (not shown) are provided on the lower surface of the lower portion 327' of the surrounding wall 327, in a similar manner to that of the wedges 328 shown in Figures 5 and 7. In this alternative example of the card receiver 310, as shown in Figure 10 two wedge shaped  
25 fingers 338 are provided within the cut out portion 337. The wedges 338 are designed to latch against tabs 336 which are bent back from the computer system housing wall 340. As a result of the engagement between the wedge shaped portions and the tabs 336, the wedge shaped portions 338 are caused to deflect slightly downwards into the card slot 316. This means that when a card 23 is inserted in the card receiving slot  
30 316, the underside of the wedge shaped portions 318 presses lightly on the card 23, to

assist in securing the card in place and preventing undesirable movement of the card with respect to the card reader 330.

Figure 11 illustrates a detail of the card receiver 310 of Figures 9 and 10, showing how the wedge shaped portion (or finger) 338 presses against the card 23 to assist with the secure location of the card 23. Figure 11 shows the card 23 partially inserted. The operation of the wedge shaped finger 38 also assists in preventing movement of the card (for example as a result of any vibration applied to the system unit) when it has been fully inserted. It can thereby assist in reducing any danger of affecting the contacting between the circuit contacts on the card and the reader contacts in the card reader 330. The other reference signs used in Figure 11 correspond to those used in Figure 10.

It will be appreciated that the various embodiments of the invention described herein provide an effective way of securing a system configuration card in place within a system unit, for example a computer server. The type of restraining device actually used to pass through the hole 314 and to engage within the notch 302 in the system configuration card can be chosen to achieve a desired degree of security. For example, if it is desired merely to avoid accidental removal of the system configuration card, a simple cable tie, a spring clip, or a peg designed to have an interference fit within the hole 314 could be used. If a greater degree of security is desired, a small padlock (for example, a small padlock such as one would use with a suitcase) could be used. Such a padlock could be key operated, or could be a combination lock. If a greater degree of security is required, then a wire could be passed through the hole 314 and the two ends of the wire could be sealed together using a metal or other seal.

Although a particular embodiment of the invention has been described, it will be appreciated that the invention is not limited thereto and that many modifications, including additions, deletions and substitutions may be made within the scope of the claimed invention.



5

1. The first step is to identify the problem or question that needs to be answered. This involves understanding the context and the specific requirements of the task.

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CLAIMS

1. A system configuration card for providing system configuration information to a system unit, the card including a circuit, circuit contacts and a notch in one edge  
5 of the card, the notch being configured to cooperate with a restraint when located in a card reading station for securing the card in the card reading station.
2. The system configuration card of claim 1, wherein the card is rectangular, having two shorter edges at opposite ends of the card and two longer edges at  
10 opposite sides of the card, the notch being provided in one of the shorter edges.
3. The system configuration card of claim 2, wherein the circuit contacts are located towards one of the shorter edges at one end of the card, the notch being formed in the shorter edge at the other end of the card.
4. A system configuration card reading station for reading a system configuration  
15 card according to any preceding claim, the reading station comprising a card receiver defining a slot for receiving the card, and a card reader including card reader contacts for contacting the circuit contacts on the card wherein the card  
20 reader contacts are located so as to contact the circuit contacts on the card when the card is received within the slot, the card receiver further being configured to enable a restraint to engage the notch in the card for securing the card in the card  
reading station when the card is received within the slot.
5. The system configuration card reading station of claim 4, wherein the card  
25 receiver comprises a protuberance, the slot comprising a passage with a slit-shaped cross section that is open at one end of the protuberance and passes through the protuberance in the direction of the card reader.
6. The system configuration card reading station of claim 5, wherein a hole is  
30 formed in the protuberance, which hole passes between opposite surfaces of the

protuberance through the slit-shaped passage at a position corresponding to that occupied by the notch in a said system configuration card inserted in the slot with the card reader contacts in contact with the circuit contacts on the card.

- 5 7. The system configuration card reading station of claim 6, further comprising a restraint that is manually insertable through the hole to engage the notch in the card, thereby securing the card in the slot.
8. The system configuration card reading station of claim 7, wherein the restraint is  
10 a padlock.
9. The system configuration card reading station of claim 7, wherein the restraint is a cable tie.
- 15 10. The system configuration card reading station of claim 7, wherein the restraint is a wire with a seal.
11. The system configuration card reading station of any of claims 4 to 10, wherein the card receiver comprises a slot-defining unit mountable in an aperture in a  
20 wall of a system unit.
12. The system configuration card reading station of claim 11, wherein the card receiver comprises a first portion of larger cross-sectional area that defines a protuberance to project from the wall and a second portion of smaller cross-  
25 sectional area to be received within the aperture in the wall, the slot passing through both portions of the card receiver to define a slot that passes through the wall of the system unit.
13. The system configuration card reading station of claim 12, wherein the second  
30 portion of smaller cross-sectional area includes wedge-shaped detents configured, for mounting of the card receiver in the aperture, to pass through the

aperture in the wall of the system unit and to latch behind the wall when the card receiver is fully inserted.

14. A card receiver for a system configuration card reading station of any of claims

5 4 to 13, wherein the card receiver forms a slot-defining unit mountable in an aperture in a wall of a system unit, the card receiver comprises a first portion of larger cross-sectional area that defines a protuberance to project from the wall and a second portion of smaller cross-sectional area to be received within the aperture in the wall, the slot passing through both portions of the card receiver  
10 to define a slot that passes through the wall of the system unit, the first portion further comprising a hole formed in the protuberance, which hole passes between opposite surfaces of the protuberance and traverses the slot for receiving a restraint to engage the notch in the card for securing the card in the card reading station.

15. The card receiver of claim 14, wherein the second portion of smaller cross-

15. The card receiver of claim 14, wherein the second portion of smaller cross-sectional area includes wedge-shaped detents configured, for mounting of the card receiver in the aperture, to pass through the aperture in the wall of the system unit and to latch behind wall when the card receiver is fully inserted.

20

16. A computer system comprising the system configuration card reading station of any of claims 4 to 13.

17. A method of securing a system configuration card for providing system

25 configuration information to a system unit in a card reading station in the system unit, the method comprising:

- providing a system configuration card that includes a circuit, circuit contacts and a notch in one edge of the card;
- inserting the card in a card receiving slot in a card receiver until the  
30 circuit contacts make contact with reader contacts of a card reader; and

- engaging a restraint with the notch to secure the card in the card reading station.

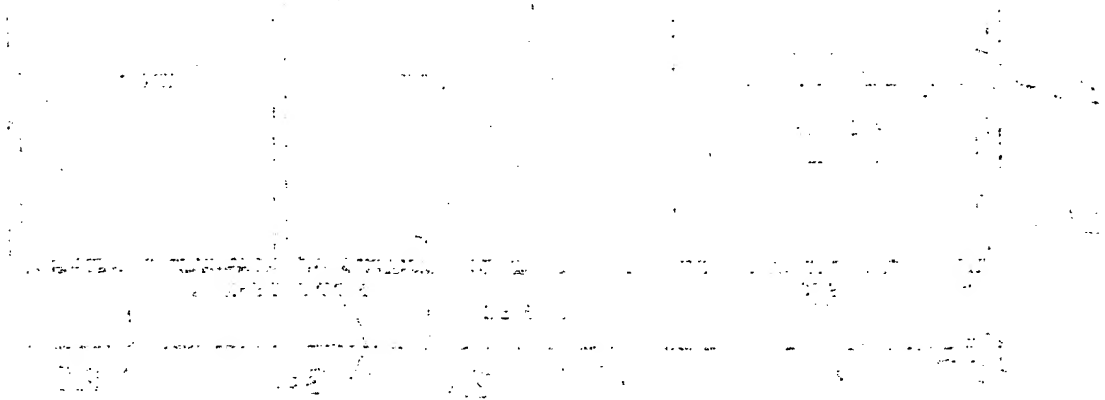
18. The method of claim 17, wherein a hole in the card receiver aligns with the notch when the circuit contacts make contact with the reader contacts of a card reader, the method further including manually engaging the restraint with the notch in the card.
19. A system configuration card substantially as hereinbefore described with reference to the accompanying drawings.
20. A system configuration card reading station substantially as hereinbefore described with reference to the accompanying drawings.
21. A computer system substantially as hereinbefore described with reference to the accompanying drawings.
22. A method of securing a system configuration substantially as hereinbefore described with reference to the accompanying drawings.

## ABSTRACT

## SYSTEM CONFIGURATION CARD SECURITY

- 5 A system configuration card provides system configuration information to a system unit. The card includes a circuit, circuit contacts, and a notch in one edge of the card. The notch is configured to cooperate with a restraint when located in a card reading station for securing the card in the card reading station. A system configuration card reading station comprises a card receiver defining a slot for receiving the card, and a
- 10 card reader including card reader contacts for contacting the circuit contacts on the card. The card reader contacts are located so as to contact the circuit contacts on the card when the card is received within the slot. The card receiver is configured to enable a restraint to engage the notch in the card for securing the card in the card reading station when the card is received within the slot. The restraint could be in the
- 15 form, for example, of a padlock, a cable tie, or the like, to be operated manually, or it could be, for example a sprung or solenoid operated latch to be operated automatically.

FIG 2



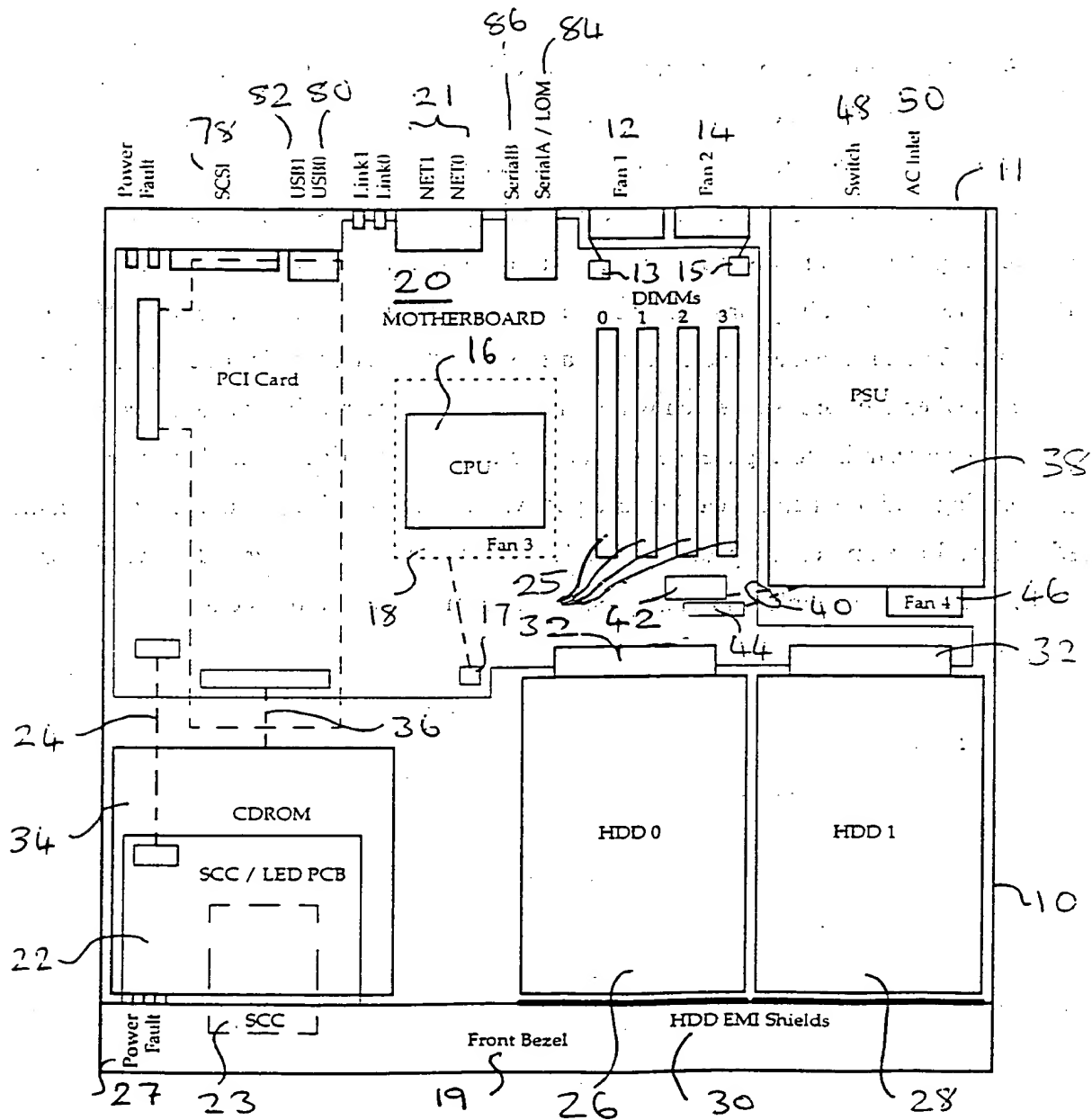


FIG 1

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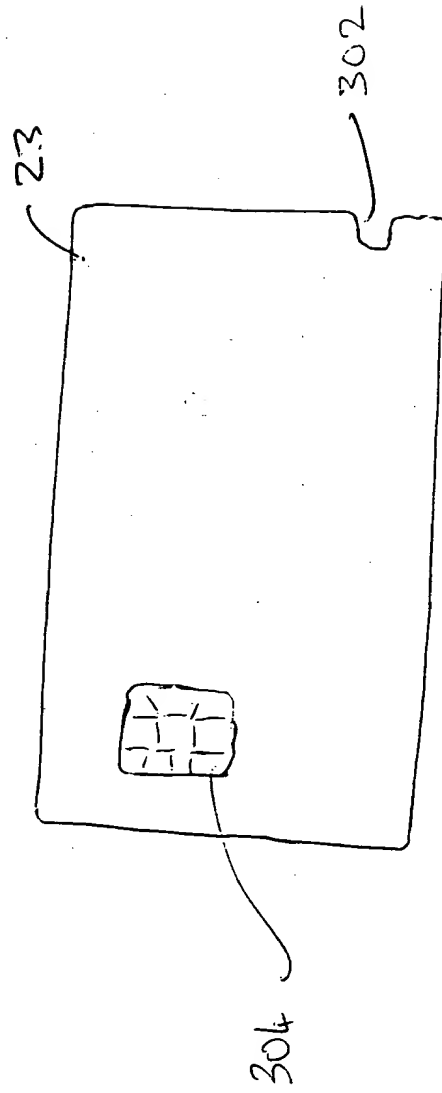


FIG 2

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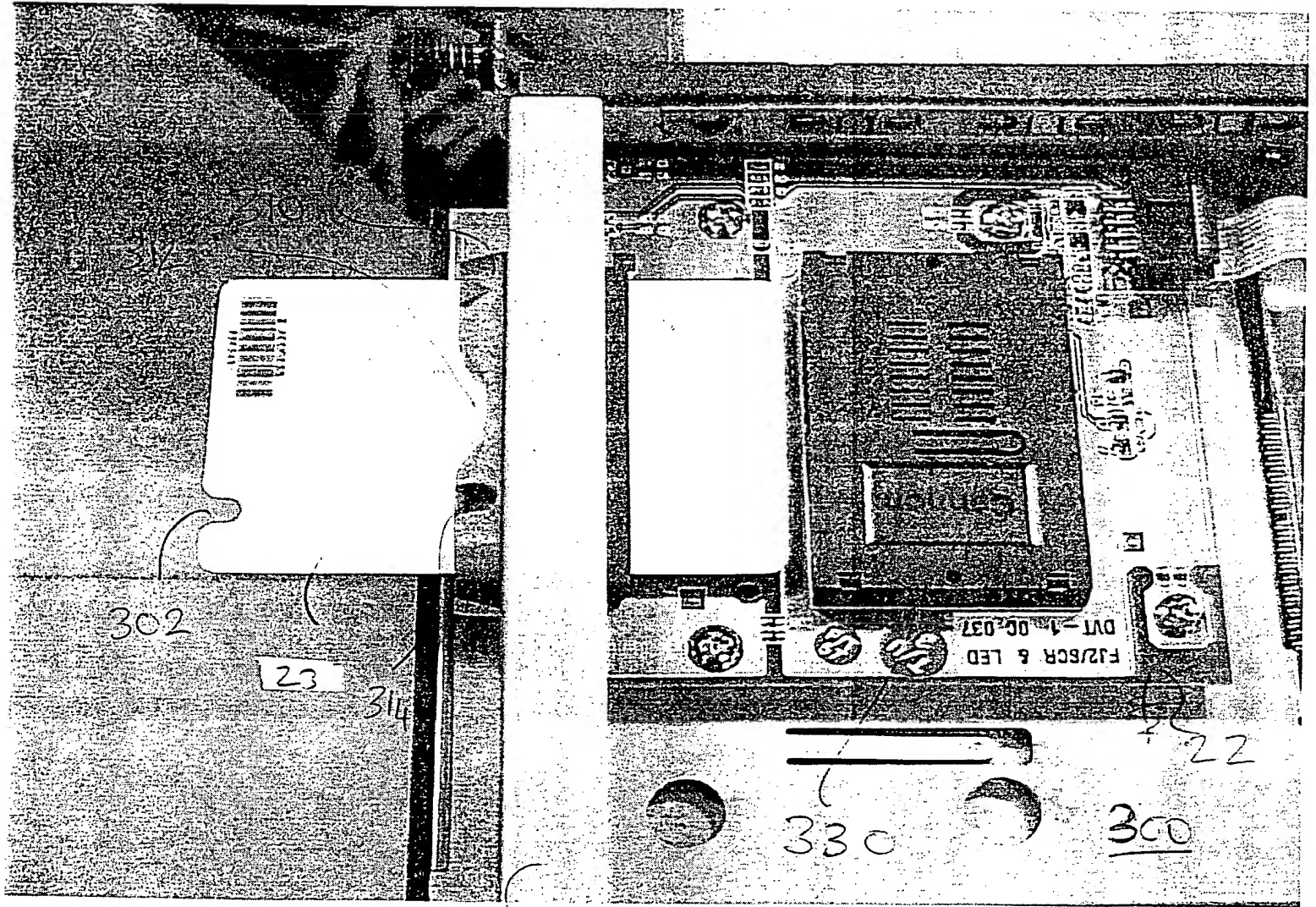


FIG 3

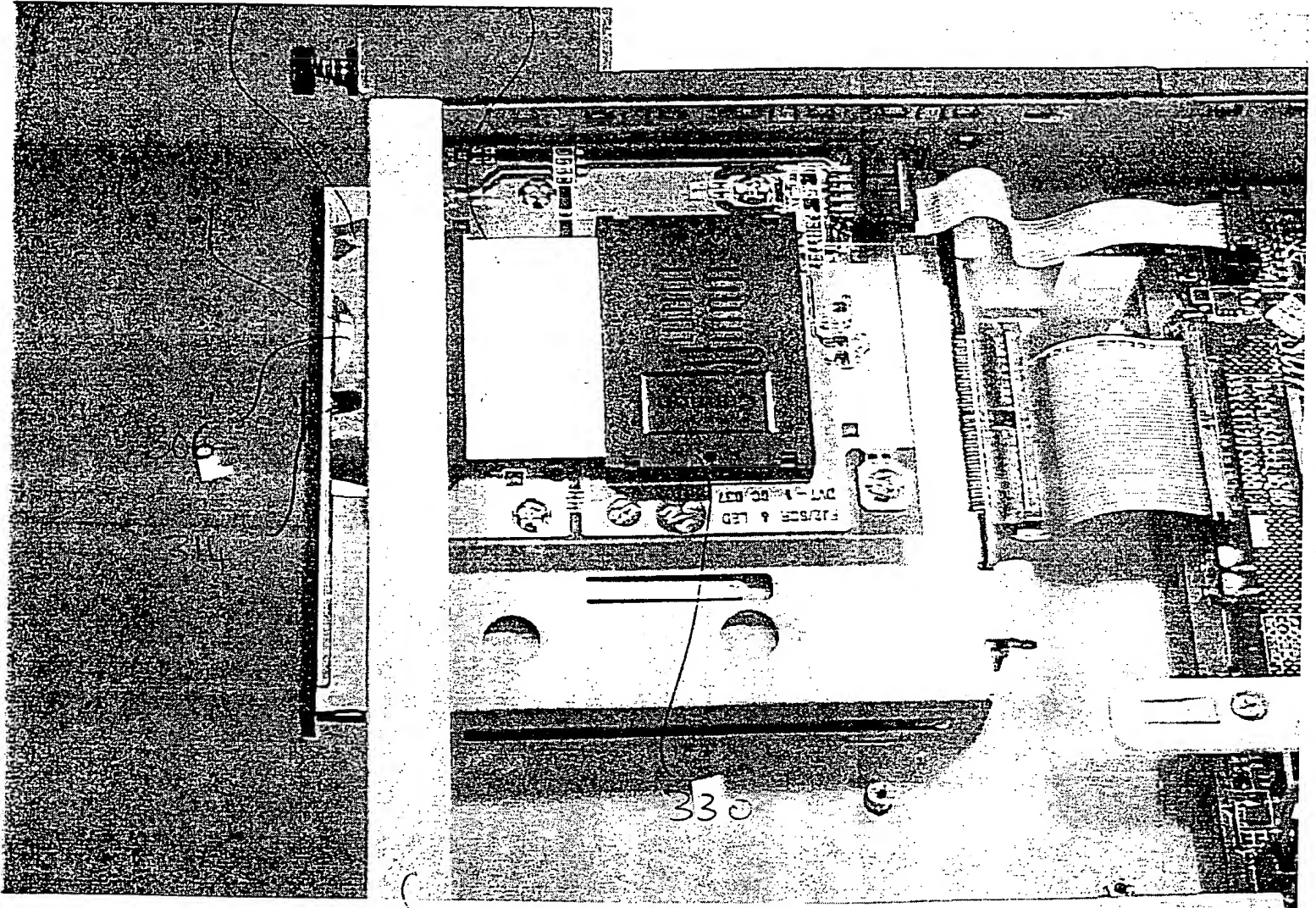
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FIG 4

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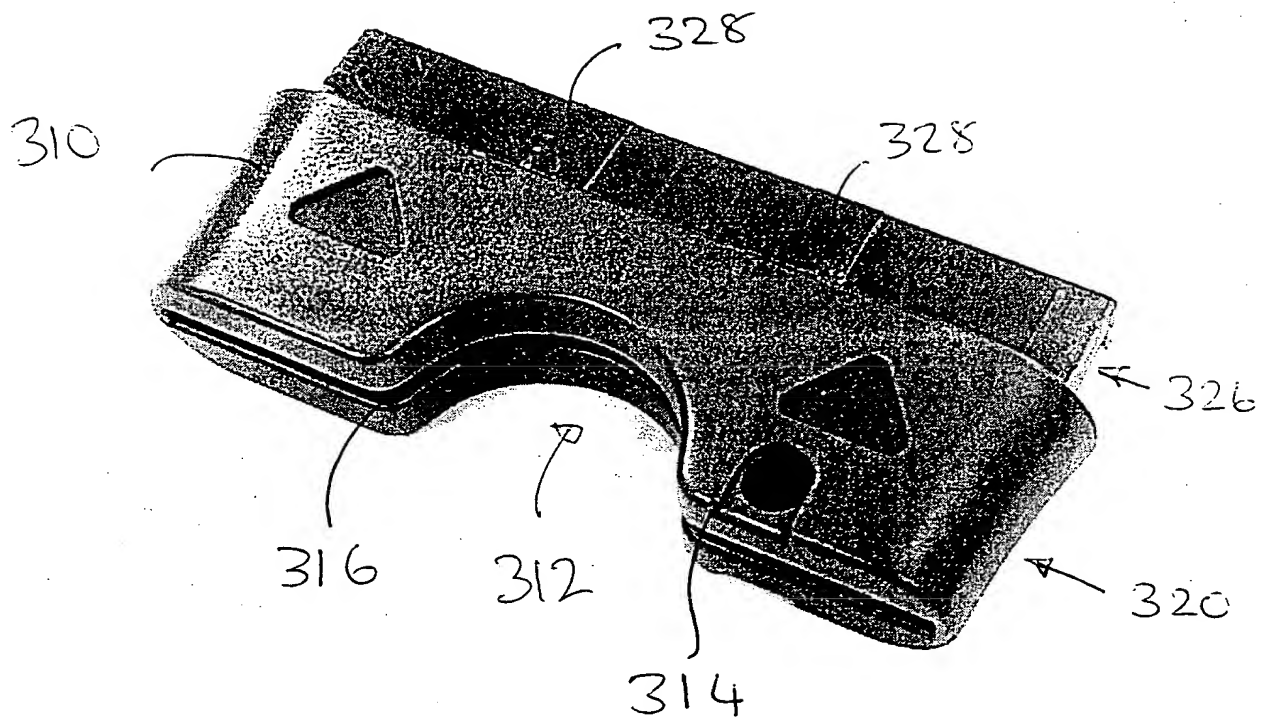


FIG 5

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6/11

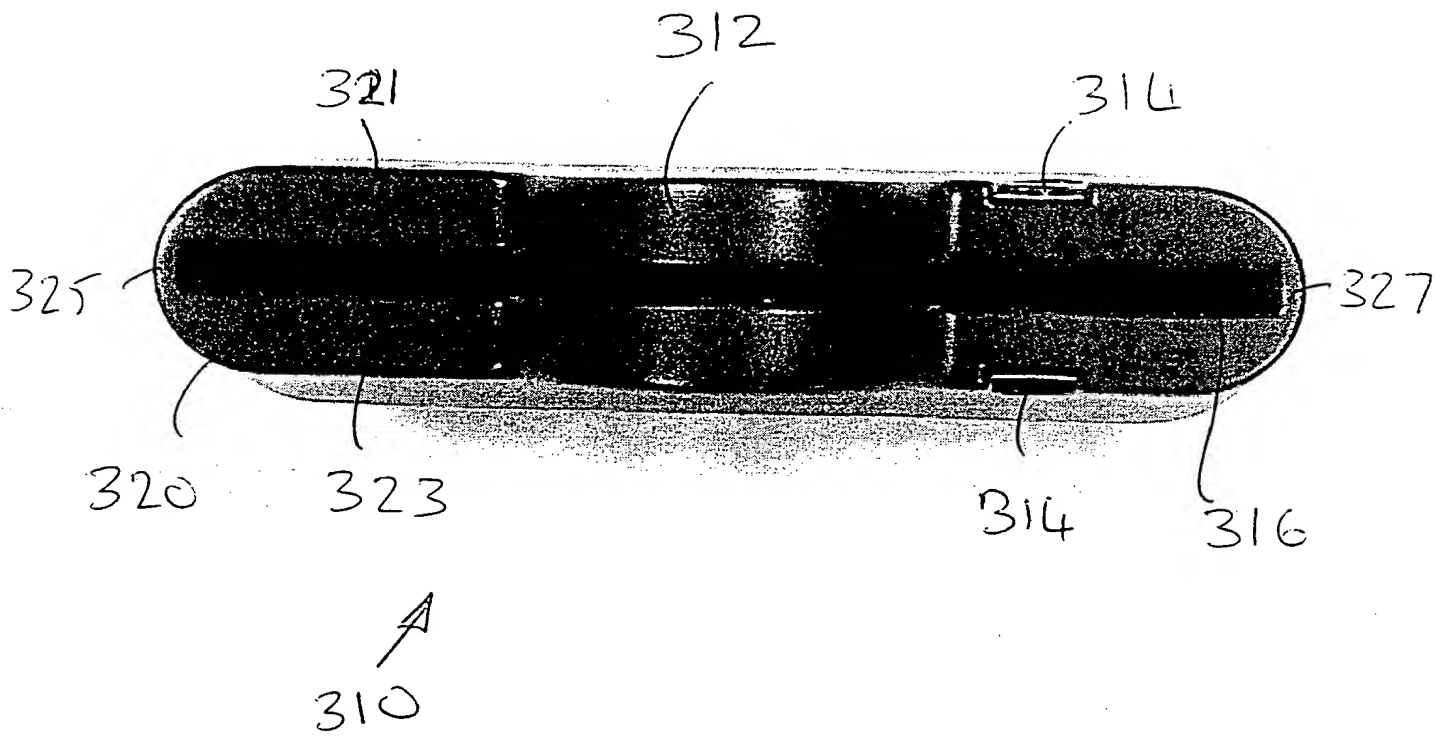


FIG 6

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7/11

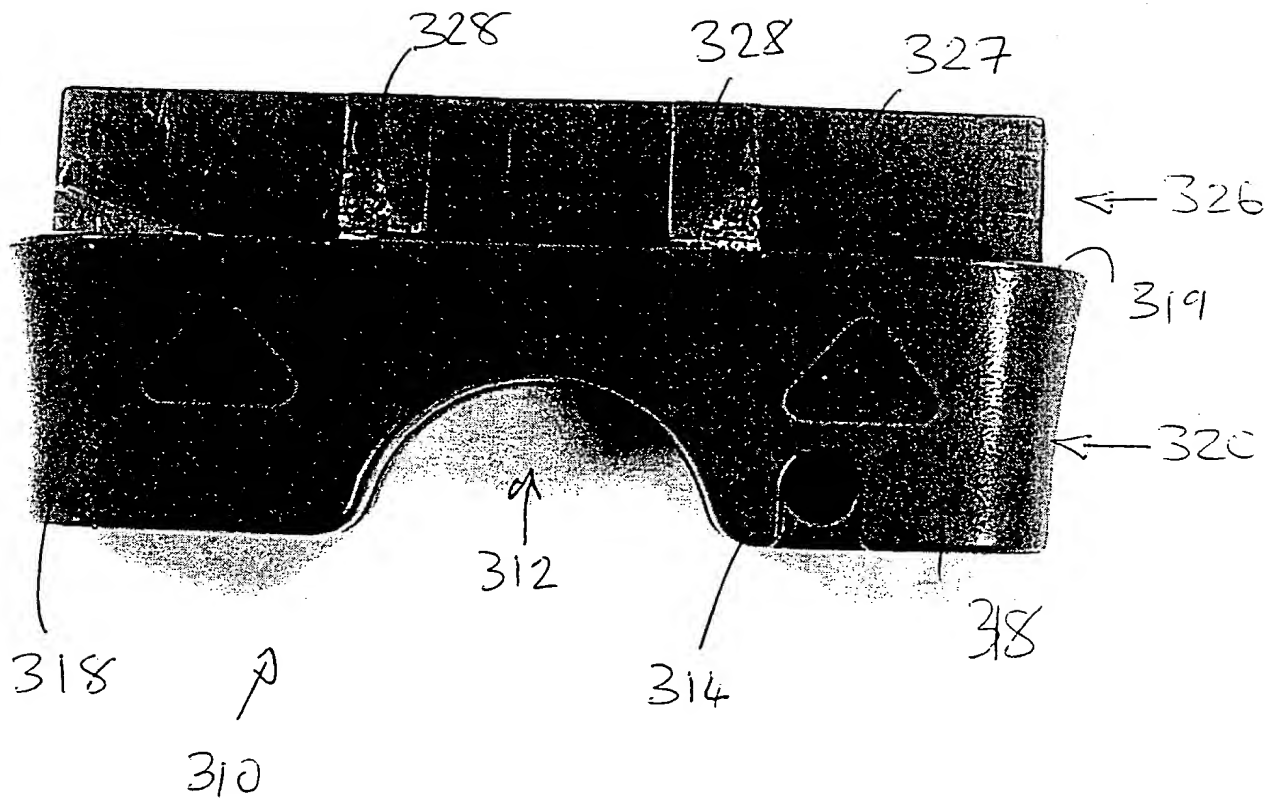


FIG 7.

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8/11

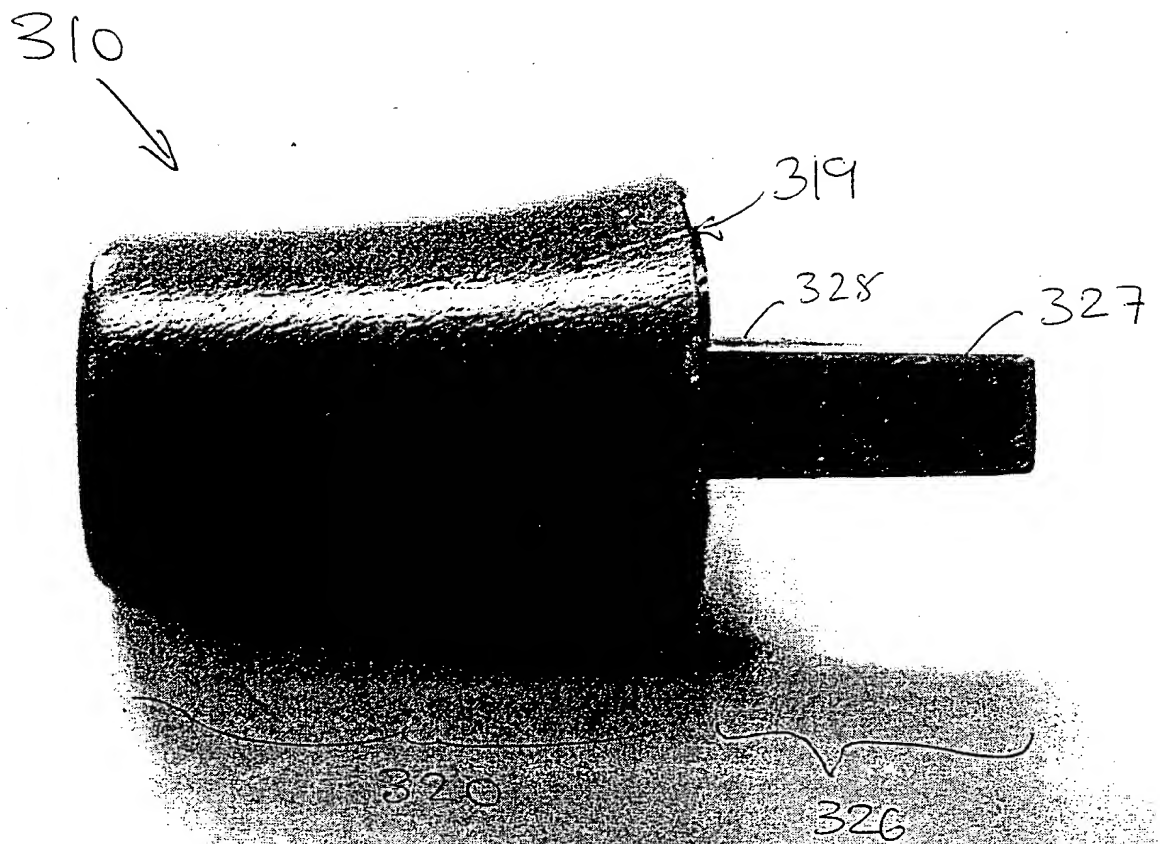
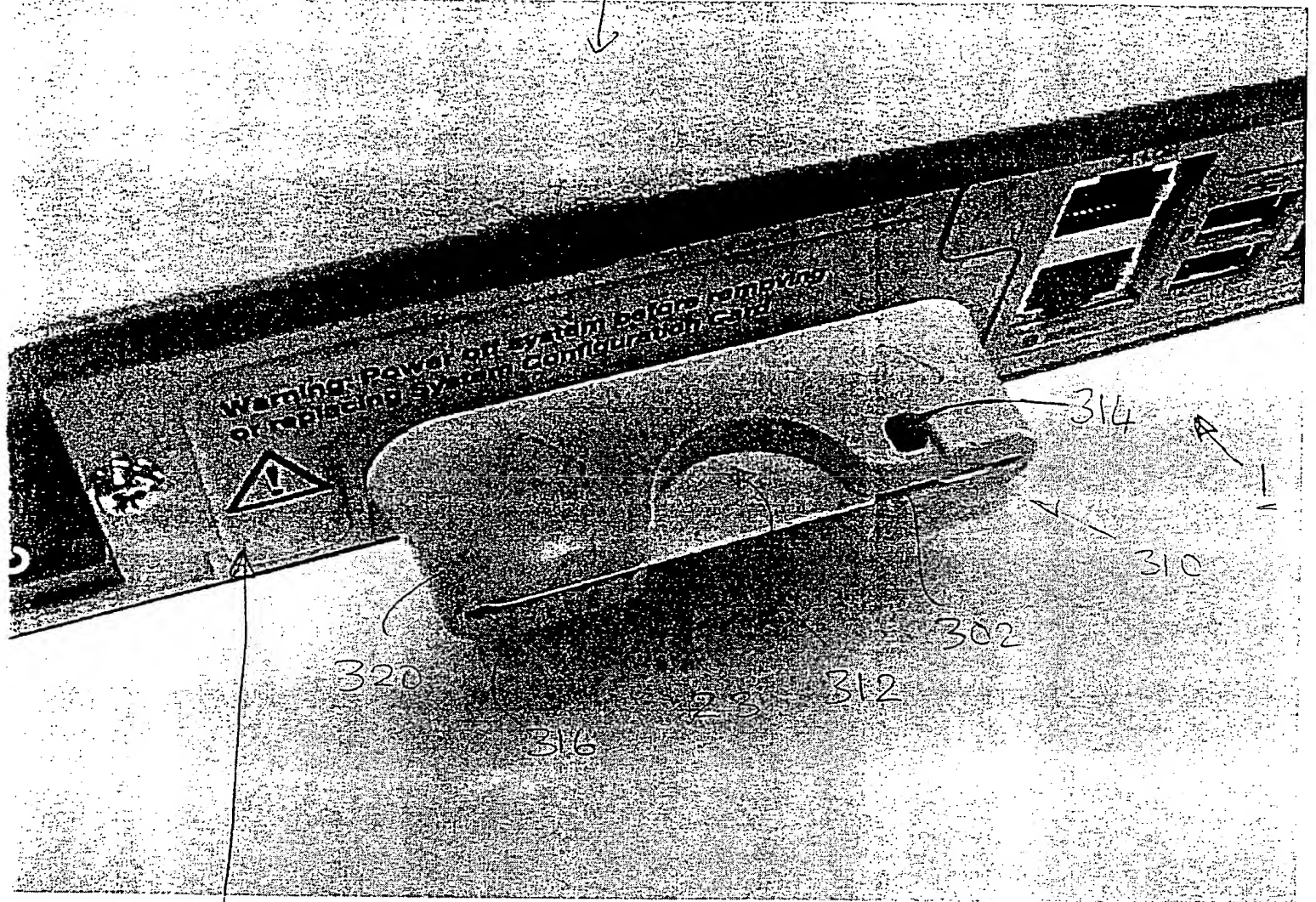


FIG 8

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9/11

600



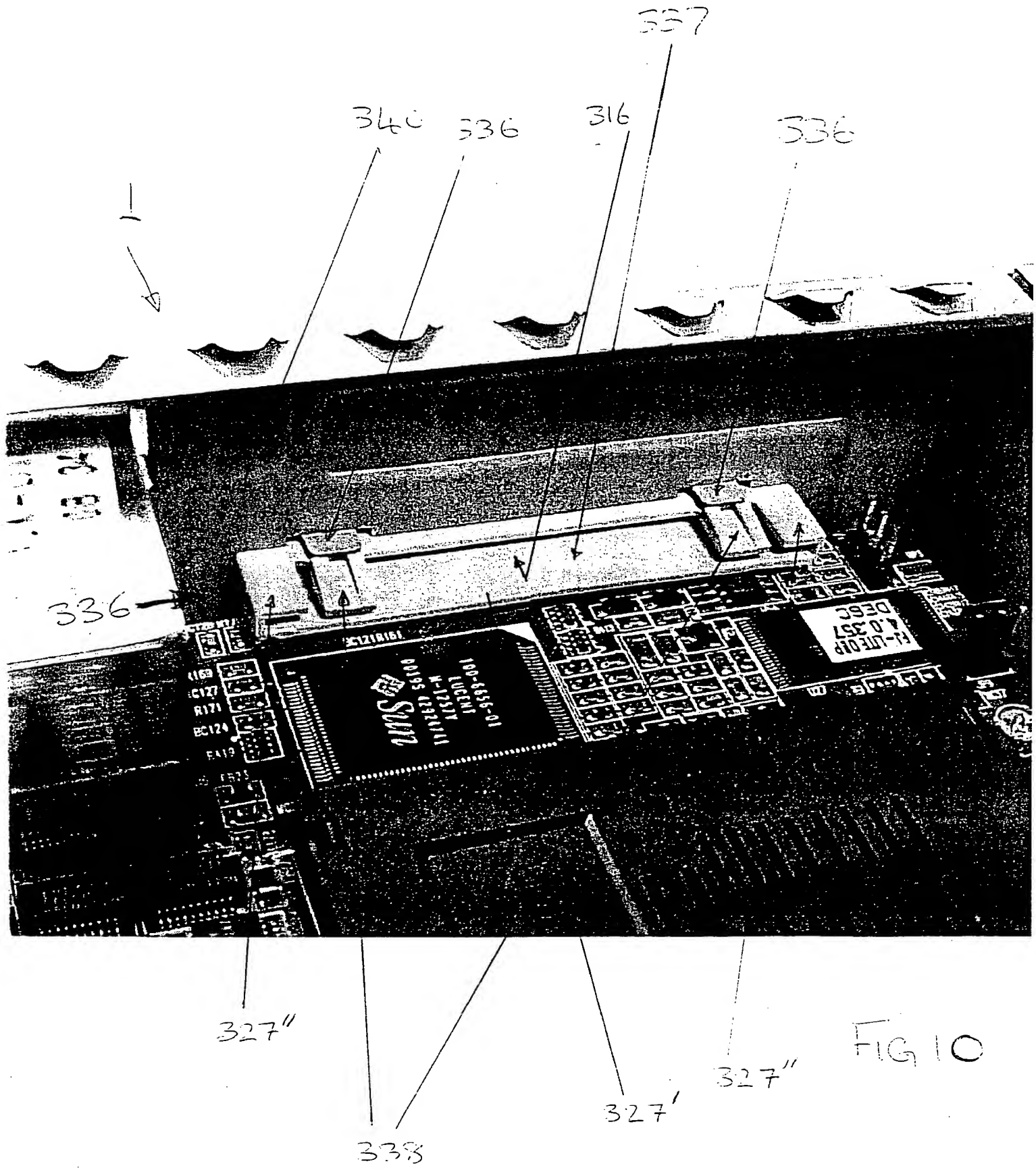
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FIG 9

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10/11



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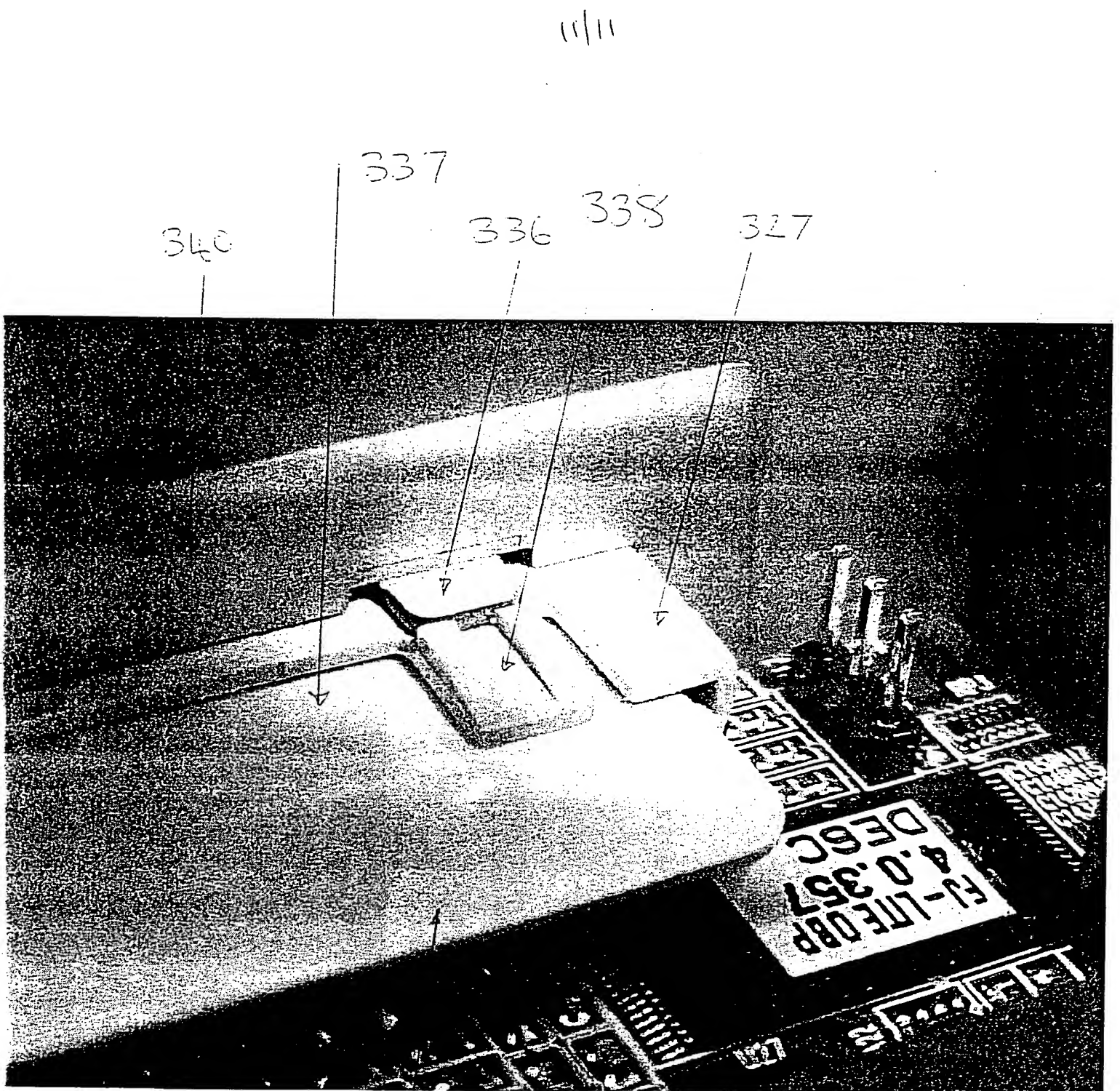


FIG 11

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